

## PATENT ABSTRACTS OF JAPAN

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(54) DEVICE DRIVEN BY ELECTRICITY EQUIPPED WITH FUEL CELL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a device drive by electricity equipped with a fuel cellcapable of being installed on a portable device in a compacting way and achieving miniaturization and lighteningwhile using the fuel cell.

SOLUTION: This device driven by electricity provided with the fuel cell 10is driven by electricity provided with a casing 2. At least a pair of wall parts 2d facing each other is formed in the casing 2. A cell stack constituting the fuel cell 10 is provided between the wall parts 2d. The cell stack receives pressure from a pair of the wall parts 2dso that the cell stack is pinched between the wall parts 2d and installed in the casing 2.

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## CLAIMS

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[Claim(s)]

[Claim 1] Are equipment driven by electrical and electric equipment provided with a case and a wall of a couple which counters at least is formed in said case. Equipment driven by electrical and electric equipment provided with a fuel cell characterized by allocating a cell stack which constitutes a fuel cell between said walls pinching said cell stack in response to a pressure from a wall of said couple and coming to be attached to a case.

[Claim 2] Are equipment driven by electrical and electric equipment provided with a case and a wall of a couple which counters at least is formed in said case. Equipment driven by electrical and electric equipment provided with a fuel cell characterized by allocating a fuel cell between said walls pinching said fuel cell in response to a pressure from a wall of said couple and coming to be attached to a case.

[Claim 3] A wall in which air supply of a cell which constitutes said fuel cell formed in said case is possible. At least one electrode module provided with a field which has airtightness in a wall in which this air supply is possible is attached to it and contacts oxygen. A sealing wall which seals a field which contacts the fuel side provided in a field in contact with said oxygen of this electrode module and a field of an opposite hand. Equipment driven by electrical and electric equipment provided with the fuel cell according to claim 1 or 2 which provides an inlet which pours in fuel gas between fields which contact this sealing wall and the fuel side of said electrode module and is characterized by things.

[Claim 4] One of Claims 1-3 which a cell which constitutes said fuel cell is provided with an electrolyte membrane which consists of proton conductors and is characterized by things -- equipment driven by electrical and electric equipment provided with a fuel cell of a description.

[Claim 5] Equipment driven by electrical and electric equipment provided with the fuel cell according to claim 4 which an electrolyte membrane which consists of

said proton conductor is provided with a basis of proton dissociation nature by using a fullerene molecule as the main components and is characterized by things.

[Claim 6] A mobile in which equipment driven by said electrical and electric equipment includes a portable electronic device and a car and Claims 1-5 to which it is characterized by being either of the type power generation systems every law are equipment driven by electrical and electric equipment provided with a fuel cell of a description either.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the equipment driven by electrical and electric equipment provided with the fuel cell which was built over the equipment driven by electrical and electric equipment provided with the fuel cells especially attained improvement in space efficiency and simplification of structure.

[0002]

[Description of the Prior Art] A fuel cell is equipment which transforms into electrical energy directly the energy released with oxidation reaction by oxidizing the chemical energy which fuel has in the Electrochemistry Sub-Division process. Energy efficiency of a fuel cell is high there are few environmental problems at clean and a low noise and utilization to various apparatus from a response being good is further desired to the load change.

[0003] However in order to perform power generation by a fuel cell. In order to need various apparatus such as a means to humidify the hydrogen supplied to a fuel cell body and a means to collect the water generated by power generation and to carry in small equipments such as a portable device for this

reason the whole system of the fuel cell needed to be miniaturized substantially.  
[0004]

[Problem to be solved by the invention] A fuel cell is made compact and the thing of the description is known by JP9-213359A as an example carried in the portable device for example. That is as shown in drawing 14 the composition whose storage of the fuel cell formed in the apparatus 100 which needs battery power supply such as a personal computer enabling free attachment and detachment was enabled is indicated.

[0005] In the above-mentioned conventional example a hydrogen humidification means is made into a sheet shaped these are package-ized collectively and it has composition included in a personal computer of a note type. That is the fuel cell 102 is used as a mechanism which became independent in the personal computer 100 and it has composition included in the space 101a formed in the case 101 of the personal computer 100.

[0006] However a cylinder which supplies a fuel cell and hydrogen gas in the above-mentioned composition a means to humidify hydrogen. Since it has composition which stores an absorber for making produced water absorb furthermore etc. in the case 102 builds this case 102 into the case 101 of the personal computer 100 and equips with it. In order to put each part in order and to store in the case 102 sufficient consideration for an absorber etc. was required because of processing of water used for humidification other than a problem that the case 102 is enlarged the personal computer 100 is also enlarged as a result and carrying becomes inconvenient and generated water.

[0007] In the conventional fuel cell it faced supplying hydrogen as fuel humidification was required and for this reason humidifying treatment before fuel supply was required.

[0008] A cell stack which bundled a cell is required for a fuel cell and this cell stack is using what carried out application-of-pressure sandwiching by a board after bundling a cell. For this reason a board which carries out application-of-pressure sandwiching was needed and there was inconvenience that cost became high.

[0009]The purpose of this invention is to provide equipment driven by electrical and electric equipment provided with a fuel cell which can realize a small weight saving though it can carry in a portable device compactly and a fuel cell is used for it.

[0010]There are other purposes of this invention in providing equipment driven by electrical and electric equipment provided with a fuel cell which can use a case of equipment driven electrically without using an individual board when a cell stack is sandwiched.

[0011]

[Means for solving problem]According to equipment driven by electrical and electric equipment provided with a fuel cell concerning this invention an aforementioned problem. Are equipment driven by electrical and electric equipment provided with a case and a wall of a couple which counters at least is formed in said case a thing a cell stack which constitutes a fuel cell is allocated between said wall said cell stack is pinched in response to a pressure from a wall of said couple and it comes to attach to a case is solved.

[0012]According to equipment driven by electrical and electric equipment provided with a fuel cell of this invention said SUBJECT. It is equipment driven by electrical and electric equipment provided with a case and a thing a wall of a couple which counters at least is formed in said case a fuel cell is allocated between said wall said fuel cell is pinched in response to a pressure from a wall of said couple and it comes to attach to a case is solved.

[0013]Thus in this invention it becomes possible to allocate a fuel cell without not providing space special to apparatus and making apparatus enlarge since it is allocating welding by pressure a cell stack and a fuel cell which constitute a fuel cell from some cases using some cases. Since a cell stack and a fuel cell which constitute a fuel cell from a case are held it becomes possible to prevent contact resistance from occurring between cells of a fuel cell.

[0014]A wall in which air supply of a cell which constitutes said fuel cell formed in said case is possible at this time At least one electrode module provided with a

field which has airtightness in a wall in which this air supply is possible is attached to it and contacts oxygen. It is suitable if an inlet which pours in fuel gas between a sealing wall which seals a field which contacts the fuel side provided in a field in contact with said oxygen of this electrode module and a field of an opposite hand and a field which contacts this sealing wall and the fuel side of said electrode module is provided and constituted.

[0015] And an electrolyte membrane which constitutes a cell which constitutes said fuel cell from an electrolyte membrane which consists of proton conductors and consists of this proton conductor is [ it has a basis of proton dissociation nature by using a fullerene molecule as the main components ] preferred if.

[0016] Thus since a fuel cell which uses an electrolyte membrane which becomes an electrolysis module from a proton conductor is used according to the fuel cell of this invention a humidifier for humidifying hydrogen gas is unnecessary and it becomes possible to have compact composition. Since it is the composition which does not humidify hydrogen and is not generated by a lot of water like the conventional fuel cell it becomes unnecessary [ a mass water retention means ].

[0017] Since the case of equipment driven electrically itself can be used while not forming a fan and being able to reduce part marks since air is supplied further again from a wall in which air supply is possible it becomes possible to provide inexpensive equipment. Although a portable device is preferred as equipment driven by electrical and electric equipment provided with a fuel cell it becomes possible to use for a type power generation system etc. a mobile including not only this but a car and every law.

[0018]

[Mode for carrying out the invention] Hereafter 1 embodiment of this invention is described based on Drawings. A component explained below the arrangement etc. cannot limit this invention and can change it variously within the limits of the meaning of this invention.

[0019] They are a perspective view in which drawing 1 thru/or drawing 4 show

fixing structure of a fuel cell of this embodiment and drawing 1 shows a personal computer as apparatus by which a fuel cell is attached and an explanatory view in which drawing 2 shows an inside of a case and an explanatory view in which drawing 3 shows A \*\* figure of drawing 2 and drawing 4 shows specific constitution of a fuel cell. They are structural drawing of poly hydroxylation fullerene as an example which drawing 7 used a fullerene molecule as the main components and was provided with a basis of proton dissociation nature and a mimetic diagram showing an example which drawing 8 used a fullerene molecule as the main components and was provided with a basis of proton dissociation nature. "Dissociation of a proton ( $H^+$ )" means "a proton separates from a functional group by ionization" and "a basis of proton dissociation nature" as used herein means "a functional group from which a proton can secede by ionization."

[0020] Although a personal computer is made into an example and explained as equipment driven electrically by this example, various electric appliances for example, television, video, a portable camera, a digital camcorder, an information terminal containing a personal computer, a facsimile, and a cellular phone containing a digital camera, a carried type, and a deferred type. Of course, it is possible to apply to a printer, a navigation system, other OA equipment, a lighting system, electrical household machinery and equipment, vehicles as a mobile, a power generation system containing home use and business use, etc.

[0021] This example explains a personal computer of a note type as an example as apparatus which needs a power supply. The personal computer 1 is provided with the following.

The case 2 which contained an electronic device as shown in drawing 1.  
 Screen 3 which engages with the case 2.

[0022] The case 2 of this example is formed by carrying out press working of sheet metal of the metal plate, such as an aluminum containing alloy. A basic control part, the fuel cell 10 as a driving source mentioned later, and CD-ROM and a floppy (registered trademark) disk containing CPU, a hard disk, etc. are built in

the case 2. For this reason it is formed in prescribed shape according to form and a size of the fuel cell 10 and a basic control part and a placement part of hydrogen cylinder B which accumulated hydrogen gas as the fuel cell 10 and fuel are formed.

[0023] In this example as shown in drawing 2 the fuel cell placement part 2a provided with the wall 2d which counters the case 2 and hydrogen cylinder placement part 2b are formed. Other apparatus such as a basic control part which is not illustrated is arranged at the placement part 2c. The fuel cell 10 is arranged that there is no crevice in the fuel cell placement part 2a and as it requires moderate face pressure for the fuel cell 10 it is held.

[0024] Thus since the fuel cell 10 is held in this example while face pressure is attached by the wall 2d of the case 2 there is no fuel cell 10 with Lycium chinense with backlash and it becomes possible to prevent inconvenience of a defect occurring with an electric flow.

[0025] If a basic control part and fuel cell 10 grade are allocated in a specified position of the case 2 as shown in drawing 3 the covering device 4 will be attached. The keyboard 5 and the touch panel 6 are allocated by the covering device 4.

[0026] Although the above-mentioned example showed an example which formed metal plate such as an aluminum containing alloy for the case 2 by press working of sheet metal it may be made to fabricate the case 2 with a synthetic resin. The shaping can use injection moulding, blow moulding, etc.

[0027] The fuel cell 10 is formed as the stack S which the cell C was made to follow in order to obtain a predetermined output. Hydrogen gas as fuel is supplied to each cell C which constitutes the stack S from the hydrogen gas bomb B. Although this example shows an example which allocated the hydrogen gas bomb B removable in the case 2, if it constitutes so that space sealed in a case may be formed, a nozzle which pours fuel such as hydrogen into this space from the exterior may be formed and a fuel path connected with the above-mentioned fuel cell 10 on the other hand may be formed, liquid hydrogen gas will be supplied to a closed space in the case 2 and it will become possible to omit the hydrogen



gas bomb B.

[0028]By constituting a nozzle so that an opening may be carried out and liquid hydrogen gas may be poured into a closed space when an inlet of liquid hydrogen gas is pressed in this case on the other hand a fuel path connected with the fuel cell 10 is formed so that a fixed quantity may supply the stack side. A fixed quantity of hydrogen will be supplied to the fuel side with a predetermined pressure by this.

[0029]As shown in drawing 3 the cell C of this example makes the fuel side of two and electrode module EM counter (using two-sheet confrontation) carries out \*\*\*\*\* of the plate 40 which attached electrode module EM carries out the seal of each end by the seal member 30 and is formed as sealed structure. The hole 41 is formed in the plate 40 and it is constituted so that air may be supplied to each electrode module EM from this hole 41.

[0030]Therefore it is not necessary to provide a blowing means of a fan etc. in the case 2 separately and noise by a motor etc. which drive a fan does not occur. Therefore it becomes possible to obtain the personal computer 1 with sufficient user-friendliness with little noise.

[0031]The electrolyte membrane 11 which electrode module EM becomes from a proton conductor and the frame 20 (conductivity) of prescribed shape which supports the electrolyte membrane 11. It comprises the insulator 12 located between the electrolyte membrane 11 and the frame 20, the electrode layer 13 by the side of fuel, the electrode layer 14 by the side of air, a catalyst film that were provided in the electrode layers 13 and 14 and that is not illustrated, and the sheet films 17 and 18. The sheet films 17 and 18 have the function to send dispersive more well a function for maintenance of the electrode layers 13 and 14 and intensity and hydrogen gas and oxygen to a catalyst and to be easy to cause electrochemical reaction and to remove output (water).

[0032]In the cell C of this example hydrogen gas as fuel is supplied via the gas supply line 31 from the nozzle communicating tube 32 of fuel gas which served as a spacer. Hydrogen gas is accumulated in the hydrogen gas bomb B, is poured

in from a center of the cell C from the nozzle communicating tube 32 and it is constituted so that fuel may be supplied to electrode module EM of both sides.

[0033] The stack S which can supply electric power required in order to make two or more cells C which consist of the above-mentioned composition laminate and to make the personal computer 1 drive is formed. Thus when two or more cells C are made to laminate in order to supply hydrogen to each cell C each cell C and hydrogen cylinder are connected by two or more nozzle communicating tubes 32.

[0034] Next the electrolyte membrane 11 which consists of a proton conductor used with a fuel cell concerning this invention is explained. As the electrolyte membrane 11 which consists of proton conductors as shown in drawing 7 poly hydroxylation fullerene is a general term for a thing with structure which added two or more hydroxyl groups to fullerene and is called a common name "FURARE Norian (Fullerenol)." With a natural thing FURARE Norian in 1992 by Chiang and others. First. A synthetic example. Reported (Chiang L. Y. ; Swirczewski J. W. ; Hsu C. S. ; Chowdhury S. K. ; Cameron S. ; Creagan K. J. Chem. Soc Chem. Commun. 1992 1791. Since then the feature which is water solubility has attracted attention and especially FURARE Norian that introduced a hydroxyl group more than a constant rate has mainly been studied by a bio-related technical field.

[0035] It is considered as floc and made for an interaction to produce FURARE Norian in the hydroxyl groups of a FURARE Norian molecule (O shows a fullerene molecule among a figure.) which approached each other so that an outline graphic display may be carried out by drawing 8 (A). This floc demonstrates the proton conduction characteristic (if it puts in another way dissociative [ of  $H^+$  from a phenolic hydroxyl group of a FURARE Norian molecule ]) high as a macroscopic aggregate.

[0036] Floc of fullerene which has two or more  $-OSO_3H$  bases for example in addition to above-mentioned FURARE Norian may be used for an electrolyte membrane which consists of proton conductors as a proton conductor. Poly hydroxylation fullerene i.e. sulfuric acid hydrogen esterification FURARE Norian as an OH radical shows to drawing 8 (B) which replaced an  $OSO_3H$  basis After all by

Chiang and others. (Chiang L. Y. ; Wang L. Y. ; Swirczewski J. W. ; Soled S. ; Cameron S. J. Org. Chem. 1994 59 3960) reported in 1994. There may be some which contain only an  $\text{OSO}_3\text{H}$  basis in one intramolecular in fullerene by which sulfuric acid hydrogen esterification was carried out plurality and a given thing may be used in this basis and hydroxyl group respectively.

[0037] When many fullerene derivatives mentioned above are made to condense proton conductivity which it shows as bulk in order to concern with movement directly a proton originating in a lot of hydroxyl groups and  $\text{OSO}_3\text{H}$  bases which are contained in intramolecular from the first it is not necessary to incorporate hydrogen and a proton which make a steam molecule etc. the origin from atmosphere and there are not supply of moisture from the outside and restrictions of as opposed to [ it is not necessary to especially absorb moisture etc. from the open air and ] atmosphere. Fullerene used as a base substance of these derivative molecules has electrophilic character especially and this is considered to have contributed to promotion of ionization of a hydrogen ion greatly also not only in an  $\text{OSO}_3\text{H}$  basis with high acidity but in a hydroxyl group etc.

[0038] Since quite many hydroxyl groups an  $\text{OSO}_3\text{H}$  basis etc. can be introduced into one fullerene molecule number density per conductor volume of a proton in which conduction participates increases dramatically.

[0039] Since the most comprises a carbon atom of fullerene the proton conductor of this example cannot deteriorate easily by weight being light either and a pollutant is not contained either. A manufacturing cost of fullerene is also falling rapidly, seeing resources-wisely environmentally and economically – which material of others [ fullerene ] – furthermore it is thought that it is a carbon system material near an ideal.

[0040] It is not necessary to limit a basis of proton dissociation nature to a hydroxyl group and an  $\text{OSO}_3\text{H}$  basis which were mentioned above. Namely this dissociative basis is expressed with formula  $\text{-XH}$  and X should just be arbitrary atoms or an atom group who has a divalent coupling means. This basis is

expressed with formula -OH or -YO and Y should just be arbitrary atoms or an atom group who has a divalent joint hand.

[0041] Specifically as a basis of proton dissociation nature -OPO[SO<sub>3</sub>H and -] (OH) either -COOH or 2 is preferred in addition to the aforementioned -OH and -OSO<sub>3</sub>H.

[0042] It is preferred that an electron withdrawing group for example a nitro group a carbonyl group a carboxyl group a nitrile group an alkyl halide group a halogen atom (fluorine chlorine etc.) etc. are introduced into a carbon atom which constitutes a fullerene molecule from this example with a basis of proton dissociation nature. A fullerene molecule which introduced Z out of -OH is shown in drawing 8 (C). Specifically this Z is -NO<sub>2</sub>-CN-F-C<sub>1</sub>-COOR-CHO-COR-CF<sub>3</sub>-SO<sub>3</sub>CF<sub>3</sub> etc. (R expresses an alkyl group here). Thus if an electron withdrawing group coexists a proton will dissociate easily from a basis of the above-mentioned proton dissociation nature for the electronic suction effect.

[0043] However although the number of the bases of the proton dissociation nature introduced into a fullerene molecule may be arbitrary within the limits of the carbon number which constitutes a fullerene molecule it is good to consider it as five or more pieces desirably. In order to leave the pi electron nature of fullerene and to take out effective electronic suction nature below half of the carbon number which constitutes fullerene of the number of the above-mentioned groups is preferred.

[0044] What is necessary is just to introduce the basis of desired proton dissociation nature into the composition carbon atom of a fullerene molecule by giving combining publicly known processing of acid treatment hydrolysis etc. suitably as opposed to the powder of a fullerene molecule in order to compound the fullerene derivative used for a proton conductor.

[0045] If it states more concretely composition of poly hydroxylation fullerene Document (Chiang L. Y. ; Wang L. Y. ; Swirczewski J. W. ; Soled S. ; Cameron S. J. Org. Chem. 1994 59 3960) was referred to and was performed. The powder 2g of the C<sub>60</sub>/C<sub>70</sub> fullerene mixture which contains C<sub>70</sub> about 15% was

Invested into 30 ml of fuming sulfuric acid and it stirred for three days keeping at 60 °C in a nitrogen atmosphere. It was under decompression at 40 °C and it was made to dry after dropping the obtained reactant little by little in anhydrous diethylether cooled within the ice bath classifying the settlings by centrifugal separation and 2:1 mixed liquor of 3 times and diethylether and acetonitrile washing twice by diethylether further. This dry matter was put in 60 ml of ion exchange water and it stirred for 10 hours performing bubbling by nitrogen at 85 °C. After the resultant separated settlings washed these settlings several times with pure water further and repeated centrifugal separation by centrifugal separation reduced pressure drying of it was carried out at 40 °C. Thus when FT-IR measurement of the obtained brown powder was performed almost in accordance with the IR spectrum of  $C_{60}(OH)_{12}$  shown in above-mentioned document this powder was checked with the poly hydroxylation fullerene which is quality of an object.

[0046] Next manufacture of a poly hydroxylation fullerene aggregation pellet took 90 mg of powder of this poly hydroxylation fullerene and on the other hand it performed a press to a direction so that it might become a circular pellet type 15 mm in diameter. Press pressure at this time was about  $7 \times 10^8$  [N/cm<sup>2</sup>]. As a result although powder of this poly hydroxylation fullerene does not contain any binder resin it is excellent in moldability and it was able to be pelletized easily. The pellet is about 300 microns in thickness.

[0047] Composition of poly hydroxylation fullerene sulfuric acid hydrogen ester (all the esterification) referred to aforementioned document similarly and was performed. 1 mg of powder of poly hydroxylation fullerene was dropped in 60 ml of fuming sulfuric acid and it stirred for three days under a nitrogen atmosphere at a room temperature. An obtained reactant is dropped little by little in anhydrous diethylether cooled within an ice bath and the settlings are classified by centrifugal separation and after 2:1 mixed liquor of 3 times and diethylether and acetonitrile washed twice by diethylether further it was made to dry under decompression at 40 °C. Thus when TF-IR measurement of obtained powder was

performed almost in accordance with an IR spectrum of that by which sulfuric acid hydrogen esterification of all the hydroxyl groups was carried out shown in said document it has checked that this powder was quality of an object.

[0048] Manufacture of a poly hydroxylation fullerene sulfuric acid hydrogen ester aggregation pellet took 70 mg of powder of poly hydroxylation fullerene sulfuric acid hydrogen ester and on the other hand it performed a press to a direction so that it might become a circular pellet type 15 mm in diameter. Press pressure at this time was about  $7 \times 10^4$  [cm]<sup>2</sup>. As a result although this powder did not contain any binder resin it is excellent in a moldability and was able to be pelletized easily. This pellet is about 300 microns in thickness.

[0049] Composition of poly hydroxylation fullerene sulfuric acid hydrogen ester (partial esterification) invested the powder 2g of a C<sub>60</sub>/C<sub>70</sub> fullerene mixture which contains C<sub>70</sub> about 15% into 30 ml of fuming sulfuric acid and it stirred it for three days keeping at 60 °C in atmosphere of nitrogen. An obtained reactant was dropped little by little in diethylether cooled within an ice bath.

However diethylether in this case used what is not performing dehydrating treatment. Obtained settlings are classified by centrifugal separation and after 2:1 mixed liquor of 3 times and diethylether and acetonitrile washed twice by diethylether further it was made to dry under decompression at 40 °C. about [ thus/ an IR spectrum of a fullerene derivative which contains a hydroxyl group and an OSO<sub>3</sub>H basis selectively shown in said document when FT-IR measurement of obtained powder is performed and ] – I did one and it has checked that this powder was quality of an object.

[0050] Manufacture of a poly hydroxylation fullerene sulfuric acid hydrogen ester aggregation pellet took 80 mg of powder of poly hydroxylation fullerene in which sulfuric acid hydrogen esterification of the part was carried out and on the other hand it performed a press to a direction further again so that it might become a circular pellet type 15 mm in diameter. Press pressure at this time was about  $7 \times 10^4$  [cm]<sup>2</sup>. As a result although this powder does not contain any binder resin it is excellent in a moldability and it was able to be pelletized easily. This pellet was

about 300 microns in thickness.

[0051]As mentioned above since the electrolyte membrane 11 which consists of proton conductors is being used for the fuel cell 10 of this example as an electrolyte membrane Humidification of hydrogen gas is unnecessary and since it is not necessary to form a humidifier and a setting space for a humidifier is not provided in a case of the personal computer 1 it is possible to consider personal computer 1 the very thing as compact composition.

[0052]Since humidification of hydrogen gas is unnecessary water by which it is generated with the fuel cell 10 turns into only produced water by a chemical reaction in the fuel cell 10. For this reason since it is not generated by a lot of water like [ when the conventional fuel cell 10 is used ] a tank etc. which store water are not needed. For this reason it is possible to prevent weight of personal computer 1 the very thing increasing with water which did not need to secure a setting space of a storage tank and was stored.

[0053]If the produced water produced by the reaction of hydrogen in the fuel cell 10 and oxygen is used in order to cool the fuel cell 10 CPU which are the parts of the basic control part of the personal computer 1 etc. it is preferred. Since it is not generated by a lot of water like before according to the fuel cell 10 of this example it is good to arrange the sheet (not shown) which makes the fuel cell 10 adjoin and has absorptivity and to have composition which cools the fuel cell 10 using the evaporation heat of the produced water retained by this sheet.

[0054]Since it is the composition which provides the placement part of a fuel cell in a case and allocates the fuel cell 10 according to this example if it is the apparatus provided with the case which can change form by press working of sheet metal by changing the size of the stack of the fuel cell 10 it will become possible to carry the fuel cell 10 in the apparatus of all sizes.

[0055]For example it is possible to apply to the portable music reproduction player which is smaller apparatus besides the personal computer shown in this example. Drawing 5 is an explanatory view showing the case 50 of a portable music reproduction player. In this case in the former the arranging part 51 which was

allocating the charged type cell or the dry cell is made into the allocation part of a fuel cell and it has composition which has arranged the stack of a fuel cell.

[0056] Or equipment driven by electrical and electric equipment provided with a fuel cell of this invention can also be applied to a mobile which is large-sized apparatus for example vehicles a car etc. Drawing 6 is an explanatory view showing an inside of the bumper side of the fuel cell electric vehicle 60. In the case of the car 60 the engine room 65 as a case surrounded and formed without the floor panel 61 the front bumper 62 the front side member 63 and the vehicle room formation member 64 is made into an allocation part of the fuel cell 10 and it arranges a stack of the fuel cell 10.

[0057] At this time a septum is formed in the engine room 65 if needed and if a stack is allocated in space surrounded by a septum it will become possible to hold a fuel cell more certainly. Although a car as a mobile was made into an example in the above-mentioned example of course it is applicable to a case of fixed type power generation systems such as home use and business use.

[0058] Although a film made in poly hydroxylation fullerene was used as proton conducting membrane in the above-mentioned embodiment proton conducting membrane is not limited to this. Although poly hydroxylation fullerene uses a fullerene molecule as a parent and introduces a hydroxyl group into the composition carbon-content child it should just be a carbonaceous material which uses not only a fullerene molecule but carbon as the main ingredients as a parent.

[0059] A carbon cluster whose carbon atom is the aggregate which joins together hundreds of pieces and is formed from some regardless of a kind of combination between carbon-carbon and tube shape carbonaceous (common-name carbon nanotube) may be included in this carbon nature material.

[0060] Various carbon clusters which have a sphere or a spheroid in which many carbon atoms as shown by drawing 9 gather or the closed plane structure similar to these are one of the former carbon clusters. A part of ball structure of those carbon clusters as shown by drawing 10 suffers a loss a carbon cluster which has



an open end in structure a carbon cluster in which a carbon atom of most as shown by drawing 11 has the diamond structure united  $SP^3$  and also a carbon cluster which these clusters as shown by drawing 12 boiled variously and they combined may be contained.

[0061] As a basis introduced into this kind of parent what is necessary is just a basis of not only a hydroxyl group but  $-XH$  and proton dissociation nature more preferably expressed with  $-YOH$ .  $X$  and  $Y$  are arbitrary atoms or atom groups who have a divalent joint hand here  $H$  is a hydrogen atom and  $O$  is an oxygen atom. Specifically it is a sulfuric acid hydrogen ester group in addition to the aforementioned  $-OH$ . - It is preferred to  $OSO_3H$  carboxyl group  $-COOH$  and others that it is either of the  $-OPO[SO_3H$  and  $-](OH)_2$ .

[0062] It may be high conductivity glass of a proton (hydrogen ion) created by a sol gel process. This high conductivity glass is phosphoric acid-silicate ( $P_2O_5-SiO_2$ ) system glass it hydrolyzes a metal alkoxide raw material heats gel at production and  $500 - 800^\circ C$  and is by creation as glass for example. There is about 2-nanometer micropore in this glass moisture adsorbs there and movement of a proton is promoted.

[0063] It may be an organic-inorganic hybrid ion-exchange membrane. This Polyethylene oxide (PEO) and polypropylene oxide (PPO) Polytetramethylene oxide (PTMO) etc. and silica are the bipolar membrane united with a molecular level and dope MONODOTE sill phosphate (MDP) 1 and 2-tungstophosphoric acid (PWA) etc. as a proton conductivity supply agent.

[0064] It may be a self-humidification type electrolyte membrane. This film is high-distributing a platinum ultrafine particle catalyst of ultralow volume and an oxide ( $TiO_2$  and  $SiO_2$ ) super-particle terminal in a film as drawing 13 shows for example. By making a reverse use of hydrogen and oxygen to cross making water generate on a platinum catalyst and making an oxide ultrafine particle carry out adsorption water retention of the produced water a film is humidified from an inside and water content is kept high. And if a  $Pt-TiO_2$  dispersion film which high-distributed a platinum ultrafine particle ( $0.09 \text{ mg/cm}^2$ ) of particle diameter ultralow volume of

1-2 nm and a  $\text{TiO}_2$  ultrafine particle (3% of dry Nafion weight) with a particle diameter of 5 nm is used for an electrolyte. Battery operation very stable and completely highly efficient (it is about  $0.6 \text{ W/cm}^2$  at  $0.4\text{--}0.6\text{V}$ ) also in the state of no external humidifying becomes possible and it is \*\*. By any above-mentioned modification it is unnecessary in humidification to conduction of a proton and there is no change in an effect in this invention.

[0065] As mentioned above it is not necessary to form a humidifier and since the electrolyte membrane 11 which consists of proton conductors is being used for the fuel cell 10 of this example as an electrolyte membrane its humidification of hydrogen gas is unnecessary and it can have compact composition.

[0066]

[Effect of the Invention] As mentioned above it becomes possible to carry a fuel cell without enlarging apparatus without providing the special space for fuel cell allocations since it has composition which used some cases of apparatus as an allocation part of a fuel cell according to the equipment driven by electrical and electric equipment provided with the fuel cell of this invention.

[0067] While energy efficiency becomes possible [acquiring the high long power supply of durability with small lightweight composition] and being able to carry a portable device easily by carrying a fuel cell it becomes possible to use it for a long time.

[0068] Since especially the fuel cell of this invention uses the electrolyte membrane which turns into an electrolyte membrane from a proton conductor it can become unnecessary [the humidifier for humidifying hydrogen gas etc.] cannot take a setting position in the space where the main part of an information gathering device was restricted and can consider it as compact composition. It becomes unnecessary [equipment of a storage tank etc.] without adding the weight of water since it is not generated by a lot of water. A fuel cell becomes possible [obtaining the electric power always stable under low temperature environment strongly to a load change since low-temperature specification is good] and can acquire high reliability.

[0069] Since the case of the equipment driven electrically can be used without using an individual board when the cell stack which constitutes a fuel cell is sandwiched when it applies to the equipment driven by various electrical and electric equipment it becomes possible to omit the component parts of a fuel cell and practical value including a cost aspect is greatest.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is a perspective view showing the personal computer as equipment driven electrically.

[Drawing 2] It is an explanatory view showing the inside of a case.

[Drawing 3] It is A \*\* figure of drawing 2.

[Drawing 4] It is an explanatory view showing specific constitution of a fuel cell.

[Drawing 5] It is an explanatory view showing other cases which can carry a fuel cell.

[Drawing 6] It is an explanatory view showing other examples which carry a fuel cell.

[Drawing 7] It is structural drawing of the poly hydroxylation fullerene as an example provided with the basis of proton dissociation nature by using a fullerene molecule as the main components.

[Drawing 8] It is a mimetic diagram showing an example provided with the basis of proton dissociation nature by using a fullerene molecule as the main components.

[Drawing 9] It is an explanatory view showing the example of a carbon cluster.

[Drawing 10] It is an explanatory view showing the example of the carbon cluster which has an open end.

[Drawing 11] It is an explanatory view showing the example with diamond structure of a carbon cluster.

[Drawing 12] It is an explanatory view showing the example of the carbon cluster which various kinds of clusters combined.

[Drawing 13] It is an explanatory view of a self-humidification type electrolyte membrane.

[Drawing 14] It is an explanatory view showing a conventional example.

[Explanations of letters or numerals]

1 Personal computer

2 Case

2a Fuel cell placement part

2b Hydrogen cylinder placement part

2c Placement part

3 Screen

4 Covering device

5 Keyboard

6 Touch panel

10 Fuel cell

11 An electrolyte membrane

12 An insulator

13 An electrode layer by the side of fuel

14 An electrode layer by the side of air

17 and 18 A sheet film

20 A frame

30 A seal member

31 A gas supply line

32 A nozzle communicating tube

40 A plate

41 A hole

50 A case

51 A placement part

60 An electromobile

61 A floor panel

62 A front bumper

63 A front side member

64 A body formation member

65 An engine room (case)

B A hydrogen gas bomb

C A cell

EM An electrode module

S A stack

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